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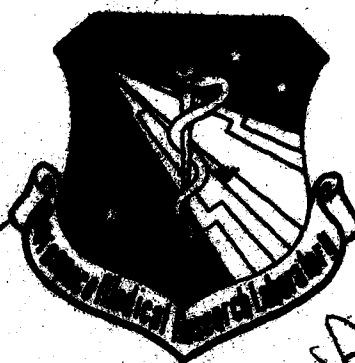
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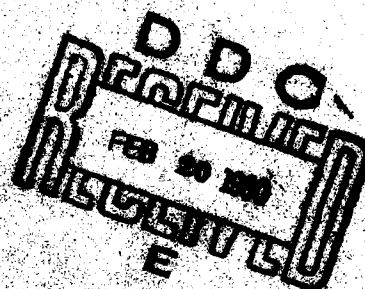
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Volume 142
F-101B In-Flight Crew Noise

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The F-101B is a two-seated, long-range, all-weather interceptor. This report provides measured data defining the bioacoustic environments at the pilot's location inside this aircraft for 15 flight conditions. Data are reported for one location in a wide variety of physical and psychoacoustic measures: overall and band sound pressure levels, C-weighted and A-weighted sound levels, preferred speech interference level, perceived noise level, and		

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limiting times for total daily exposure of personnel with and without standard Air Force ear protectors. Refer to Volume 1 of this handbook, "USAF Bioenvironmental Noise Data Handbook, Volume 1: Organization, Content and Application," AMRL-TR-75-50(1) 1975, for discussion of the objective and design of the handbook, the types of data presented, measurement procedures, instrumentation, data processing, definitions of quantities, symbols, equations, applications, limitations, etc.

PREFACE

This report was prepared by the Biodynamic Environment Branch, Aerospace Medical Research Laboratory, under Project/Task 723108, Crew Safety In Operational Noise Environments.

The author acknowledges the efforts of Mr. John N. Cole who established the data analysis requirements, Mr. Henry Mohlman and Mr. Fred Lampley of the University of Dayton who assisted in the mechanics of data processing and Mrs. Peggy Massie who typed this report and prepared it for publication.

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INTRODUCTION

The USAF F-101B is a two-seat long range all-weather interceptor manufactured by the McDonnell Aircraft Corporation. Power is provided by two J57-P-55 turbojet engines manufactured by the United Aircraft Corporation, Pratt & Whitney Aircraft Division.

This volume provides measured data defining the bioacoustic environments produced inside the aircraft. Such data are essential to evaluate ear protection requirements, limiting personnel exposure times, voice communication capabilities, and annoyance problems associated with operations of the F-101B aircraft.

This volume is one of a series published by the Aerospace Medical Research Laboratory (AMRL) under the same report number (AMRL-TR-75-50) as a multi-volume handbook that quantifies the noise environments produced at flight ground crew locations and in surrounding communities by operations of Air Force aircraft and ground support equipment. The far-field, community-type, noise data in the handbook describe the noise produced during *ground operations* of aircraft ground support equipment, and other ground-based equipment or facilities.

Volume 1 of this handbook discusses the objectives and design of the handbook, the types of data presented, measurement procedures, instrumentation, data processing, definitions of quantities, symbols, equations, applications, limitations, etc. *Refer to Volume 1* (reference 1) for such information because it is not repeated in other handbook volumes.

A cumulative index lists those aerospace systems contained in the handbook, and identifies the specific volumes containing each type of environmental noise data available (i.e., in-flight /flight crew and passenger noise, near-field/ground crew noise, far-field/community noise). Volume numbers are assigned sequentially as individual volumes are published. This index is periodically updated as individual volumes are published, and is available upon request from AMRL/BBE, Wright-Patterson AFB, OH 45433. Organizations on the distribution list for the handbook will automatically receive a copy of the updated index as it is generated.

Direct any questions concerning the technical data in this report and other handbook volumes to: AMRL BBE, Wright-Patterson AFB, OH 45433; Autovon 78-53675 or 78-53664; Commerical (513) 255-3675 or (513) 255-3664.

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1. Cole, John N., *USAF Bioenvironmental Noise Data Handbook, Volume 1: Organization, Content and Application*. AMRL-TR-75-50 (1), Aerospace Medical Research Laboratory, Wright-Patterson Air Force Base, Ohio, 1975.

IN-FLIGHT NOISE

MEASUREMENTS

All noise measurements were made on-board a F-101B aircraft during typical speed, altitude, and flight maneuver conditions. These levels describe the standard F-101B environments but may not be representative of those levels encountered if the aircraft has been configured differently (e.g., major equipment or structural changes).

Acoustic measurements were made inside the cockpit at the pilot's location. Table 1 lists the measurement location and test conditions as numeric/alphabetic designators which are used on the data pages. The designator 1/A means measurement location 1 and test condition A, etc.

The microphone was attached to the pilot's helmet by means of a lightweight boom. This arrangement enabled adjustment of the microphone close to the ear level at a distance of 0.1 meter with its diaphragm parallel and facing away from the helmet's surface. In the analysis, microphone corrections for random incidence were applied to the overall system response. The recorded samples were analyzed using a four or eight second integration time to obtain a power-averaged level which effectively smooths out short duration fluctuations and best describes the exposure.



RESULTS

The measured data presented in Table 2 define the sound pressure levels (SPL) produced inside the F-101B aircraft at the specified location. This table includes the overall, 1/3 octave band, and octave band levels. From these data, C-weighted and A-weighted sound levels, maximum permissible time for one exposure per day (AFR 161-35) with and without standard Air Force ear protectors, preferred speech interference level, and perceived noise level are calculated and presented in Table 3. These measures are widely used to assess the effects of noise on personnel and their performance.

TABLE 1
MEASUREMENT LOCATIONS AND TEST CONDITIONS

F-101B, Tyndall AFB FL, 5 June 78

<i>Location</i>	<i>Position</i>	<i>Height Above Deck</i>
1	Pilot	Seated Head Level

<i>Condition</i>	<i>Description</i>
A	Ground Run Up, Engine #1 Engine Idle — Canopy Open
B	Ground Run Up, Engine #2 Engine Idle — Canopy Open
C	Ground Run Up — Both Engines Idle — Canopy Open
D	Ground Run Up — Both Engines 70% — Canopy Open
E	Taxi — Canopy Down
F	Engine Run Up — Canopy Closed
G	Takeoff — Roll
H	Takeoff — Gear Up
I	Climb 10,000'  25,000'PA
J	Cruise 25,000'PA — 83M
K	Descent 25,000'PA  — .69M
L	High Speed Run 1500' — 250KIAS
M	Approach Traffic Pattern
N	Landing Roll
O	Taxi — Canopy Closed

All Test Conditions are recorded with EC System settings at Normal — Comfortable

TABLE: MEASURED SOUND PRESSURE LEVEL (DB)															
1/3 OCTAVE BAND															
IDENTIFICATION:															
2	OMEGA 3.2														
TEST AB-079-001															
PUN 01															
31 MAY 79															
PAGE F1															
NOISE SOURCE/SUBJECT: (OPERATION:)															
F-111B AIRCRAFT ()															
IN-FLIGHT CREW NOISE ()															
LOCATION/CONDITION															
FREQ (HZ)	1/A	1/B	1/C	1/D	1/E	1/F	1/G	1/H	1/I	1/J	1/K	1/L	1/M	1/N	1/O
25	94	96	98	97	99	77	95	88	94	76	77	85	86	96	90
31.5	97	101	111	101	103	78	93	87	89	79	77	85	85	93	92
40	86	91	91	89	91	86	93	87	95	88	96	96	95	101	98
50	38	93	92	90	90	84	95	99	96	84	81	95	95	96	92
63	34	86	88	87	88	78	91	93	96	81	81	93	93	91	83
80	81	85	85	85	84	90	99	93	94	88	89	97	99	96	92
100	83	87	86	87	88	94	105	99	102	95	91	94	93	100	93
125	32	84	83	84	84	86	94	91	89	85	81	85	84	92	85
150	79	79	81	79	81	82	91	87	88	83	81	88	87	86	81
200	80	81	82	80	82	84	90	87	92	86	82	85	84	87	79
250	85	88	88	87	85	88	94	91	92	89	87	92	87	87	83
315	87	89	89	90	81	85	91	88	92	93	87	89	86	83	79
400	85	89	89	90	81	85	92	87	90	91	87	94	86	77	73
500	85	88	87	88	83	81	92	84	88	91	87	95	83	77	76
630	87	90	89	90	79	82	88	83	88	91	85	86	81	75	73
800	90	93	93	93	81	81	89	82	87	93	86	84	81	73	72
1000	96	99	99	100	88	79	85	83	87	88	82	83	80	74	74
1250	94	101	99	101	85	79	85	81	85	87	82	81	77	71	72
1600	89	93	92	95	86	77	83	79	83	86	78	82	75	68	97
2000	32	96	95	96	90	78	83	80	84	87	82	82	78	71	72
2500	89	93	93	93	86	76	82	79	81	84	77	81	78	69	69
3150	94	97	97	98	92	79	84	77	80	85	77	77	73	72	76
4000	95	97	97	97	88	82	85	79	82	89	78	76	73	68	72
5000	33	94	95	95	85	76	82	78	81	89	76	74	72	67	69
6300	92	95	95	96	87	77	84	80	82	91	78	74	74	66	66
8000	89	92	92	92	82	73	83	76	79	88	75	71	70	64	64
10000	87	92	91	92	81	72	79	75	77	88	76	68	68	63	63
OVERALL	106	108	108	109	105	99	108	106	106	103	98	104	103	106	103
LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE															

L-LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.

TABLE: MEASURED SOUND PRESSURE LEVEL (DB)													
2 OCTAVE BAND													
IDENTIFICATION:													
NOISE SOURCE/SUBJECT: (OPERATION:)													
F-101B AIRCRAFT ()													
IN-FLIGHT CREW NOISE ()													
()													
LOCATION/CONDITION													
FREQ (HZ)	1/A	1/B	1/C	1/D	1/E	1/F	1/G	1/H	1/I	1/J	1/K	1/L	1/M
31.5	99	102	103	102	105	87	101	102	98	89	87	96	96
63	90	94	94	92	93	91	101	100	100	90	90	101	101
125	86	89	89	89	90	95	105	100	102	96	92	95	94
250	90	92	92	92	88	91	97	94	99	96	91	94	94
500	91	94	93	94	84	88	96	90	93	95	91	97	92
1000	101	102	102	104	90	84	92	87	91	95	88	87	88
2000	95	99	98	100	93	82	87	84	88	90	83	86	82
4000	99	101	101	101	94	84	88	83	86	93	82	81	77
8000	94	98	98	98	89	79	86	82	85	94	81	76	76
OVERALL	106	108	108	109	106	99	108	106	106	103	98	104	103
													106
													103
													103

